

# PCIe: do we need anything else?

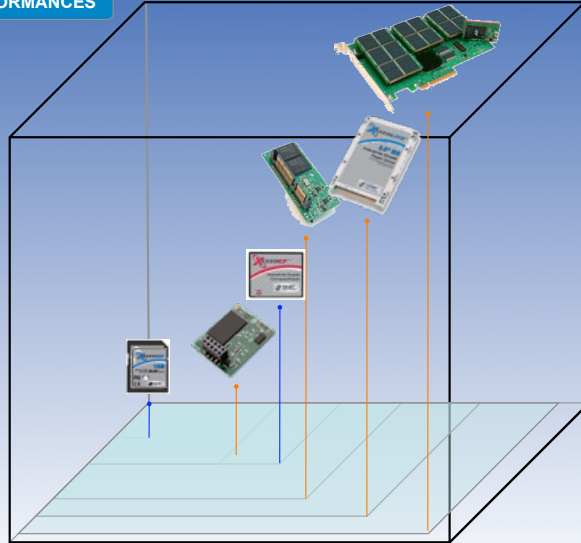
**Dr. Alessandro Fin**



- PCIe Wiki
- Today Storage Solutions
- PCIe Centric Storage Solutions
- PCIe Storage Advantages
- PCIe Cost Advantages
- OS PCIe Driver Challenges & Solution
- Competing Protocols
- Q&A

- Defined in 2004 by IBM, HP, Intel, Dell
- Current generation: 2.0 (2007)
- Communication: serial
- Connection: point to point
- Up to 32 lanes (full duplex TX-RX pair)
- Data rate: 5.0Gb/s x lane
- Options: hot pluggable & external
- Generation 3.0 release: 2010

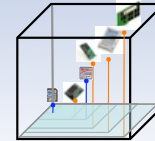
PERFORMANCES



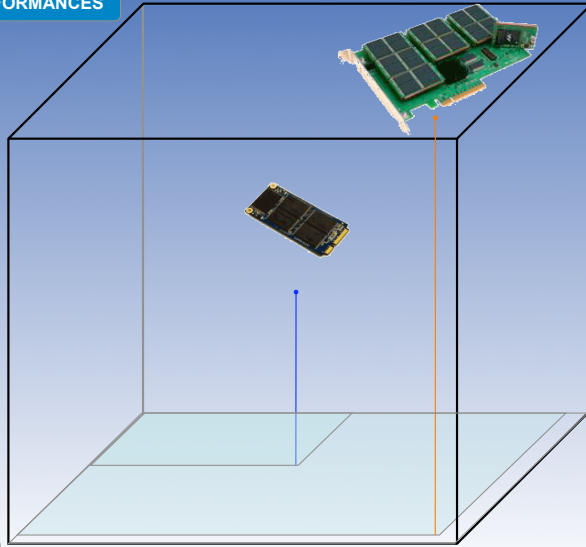
FOOTPRINT

CAPACITY  
August 2009

- Heterogeneous interfaces (6+)
- Heterogeneous OS drivers (6+)
- Heterogeneous form factors (6+)
- Limited performance scalability
- Limited capacity scalability
- Multiple host controllers (6+)
- Bandwidth constrains



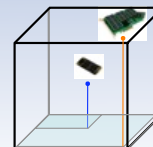
PERFORMANCES



FOOTPRINT

CAPACITY

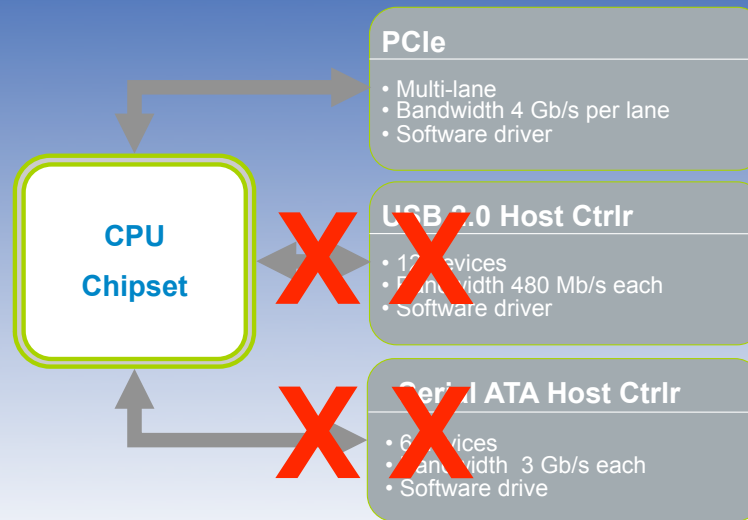
- Homogenous interface (1)
- Homogenous OS drivers (1)
- Only 2 form factors
- High performance scalability
- High capacity scalability
- Single host controllers
- Wide bandwidth (multi-lane)



- **1 interface:**  
→ *easier host design*
- **Homogenous OS drivers:**  
→ *shorter host driver debug cycles*
- **Only 2 form factors**  
→ *easier host mechanical design*
- **High performance/bandwidth scalability**  
→ *easier transition to the next gen  
application requirements*



# PCIe BOM Cost Advantages



# OS PCIe Driver Challenges

Application

OS  
OS Native SATA Driver

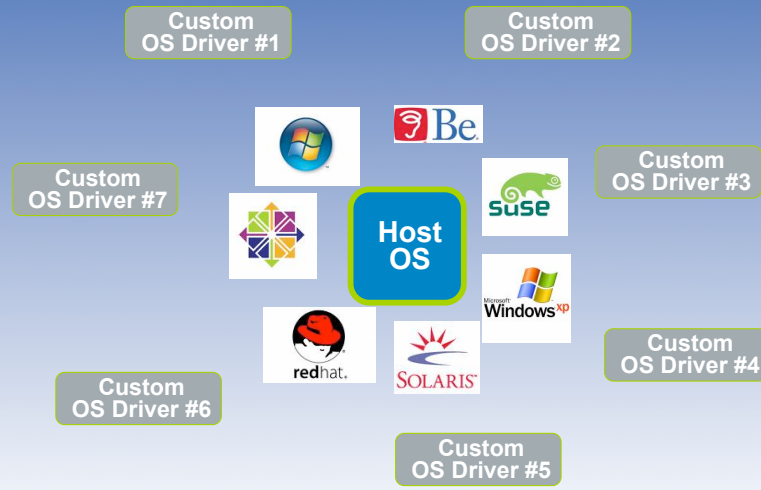
SATA SSD  
SATA Ctrlr Firmware

Application

OS  
Proprietary PCIe Driver

PCIe Storage  
PCIe Ctrlr Firmware

# OS PCIe Driver Challenges





- **Defines a std programming interface for NVM subsystems**
- **NVMHCI resisters accessible as PCI devices**
- **Decoupled NVM management and Storage & Cache algorithms**
- **Unified OS driver**

?!?